CAPSTONE™
LUNAR MISSION

PRESS KIT | NET 25 JUNE 2022

TERRAN ORBITAL™
Small Satellite. **Big Solutions.**

*Cislunar Autonomous Positioning System Technology Operations And Navigation Experiment*

CAPSTONE:™

THE LUNAR ORBITER

Tyvak Nano-Satellite Systems, a Terran Orbital Corporation, built the spacecraft for the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment, otherwise known as CAPSTONE™. The satellite includes a radio tower on top that extends its size from a traditional 12U form factor. CAPSTONE™ will not go directly to the Moon but instead follow a ballistic lunar transfer that will take it out as far as 1.5 million kilometers before returning into lunar orbit. That transfer, which will take about four months to complete, is designed to save propellant, making the mission feasible for such a small spacecraft. The CAPSTONE™ payload is built for and flown by Advanced Space, supporting NASA's Artemis missions.

CAPSTONE™ will launch from Mahia, New Zealand on a Rocket Lab Electron rocket using a Lunar Photon satellite upper stage to send the spacecraft on its planned lunar transfer trajectory. This historic pathfinding mission supports NASA's Artemis program which includes landing the first woman and first person of color on the Moon.
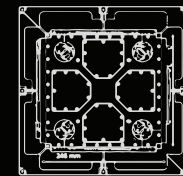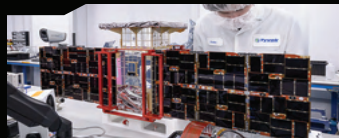
KEY FACTS
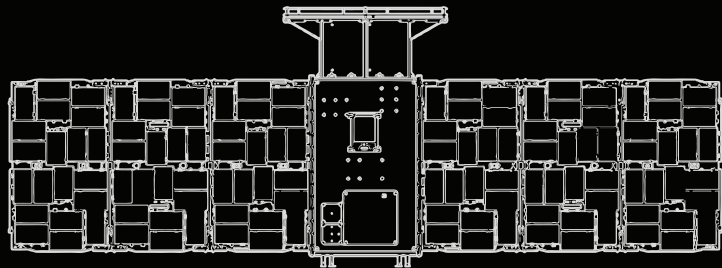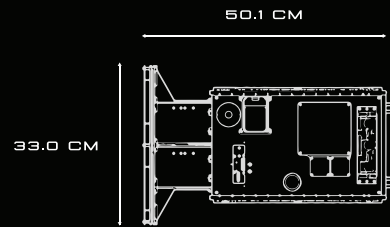
50.1 CM

33.0 CM

34.7 CM

144.5 CM

33.0 CM

33.0 CM

DURATION FROM KICKOFF TO DELIVERY: 31 MONTHS

SPACECRAFT DESIGN, BUILD, AND ASSEMBLY

TERRAN ORBITAL PRODUCTION FACILITY IN IRVINE, CA

VEHICLE PARAMETERS

SIZE: 144.5 CM x 50.1 CM x 33.0 CM
MASS: 26 KG

LAUNCH VEHICLE

ROCKET LAB ELECTRON
ROCKET WITH NEW LUNAR PHOTON
UPPER STAGE

LAUNCH SITE

MAHIA, NEW ZEALAND
LAUNCH COMPLEX 1, PAD B

| SUBSYSTEM	VALUE
AVIONICS	REDUNDANT MKII LINUX FLIGHT COMPUTERS WITH MKII RAD-TOLERANT WATCHDOG
POWER GENERATION	MKII DEPLOYABLE SOLAR ARRAYS PROVIDING 120W OF PEAK POWER
ENERGY STORAGE	TRIPLE REDUNDANT MKII 12V BATTERY MODULES
COMMAND AND CONTROL	NASA / JPL IRIS BAND RADIO PROVIDING UPLINK, DOWNLINK, AND NAVIGATION RANGING
GUIDANCE NAV AND CONTROL	REDUNDANT MKII SENSORS AND ACTUATORS, INCLUDING TWO STAR TRACKERS, FOUR REACTION WHEELS, TWO COARSE SENSOR MODULES, AND TWO IMUS
PROPULSION	STELLAR EXPLORATION HYDRAZINE PROPULSION SYSTEM PROVIDING ↑ 200 M/S FOR ORBIT ADJUST AND VEHICLE MOMENTUM MANAGEMENT
PAYLOAD PROCESSING	DEDICATED MKII LINUX FLIGHT COMPUTER PROVIDING PAYLOAD CAPS SOFTWARE ON-BOARD PROCESSING
LUNAR RECONNAISSANCE ORBITER CROSSLINK RADIO	TETHERS UNLIMTED, INC (TUI) SWIFT-SLX S BAND RADIO WITH RANGING FUNCTIONALITY
SEPARATION SYSTEM	TERRAN ORBITAL 12U DISPENSER WITH ISOLATION SYSTEM
GROUND NETWORK	NASA'S DEEP SPACE NETWORK
MISSION OPERATIONS CENTER	TERRAN ORBITAL IN IRVINE, CA WITH NAVIGATION PROVIDED BY ADVANCED SPACE

LAUNCH WINDOW OPENS

JUNE 25, 2022

(SUBJECT TO CHANGE)

MISSION OBJECTIVES
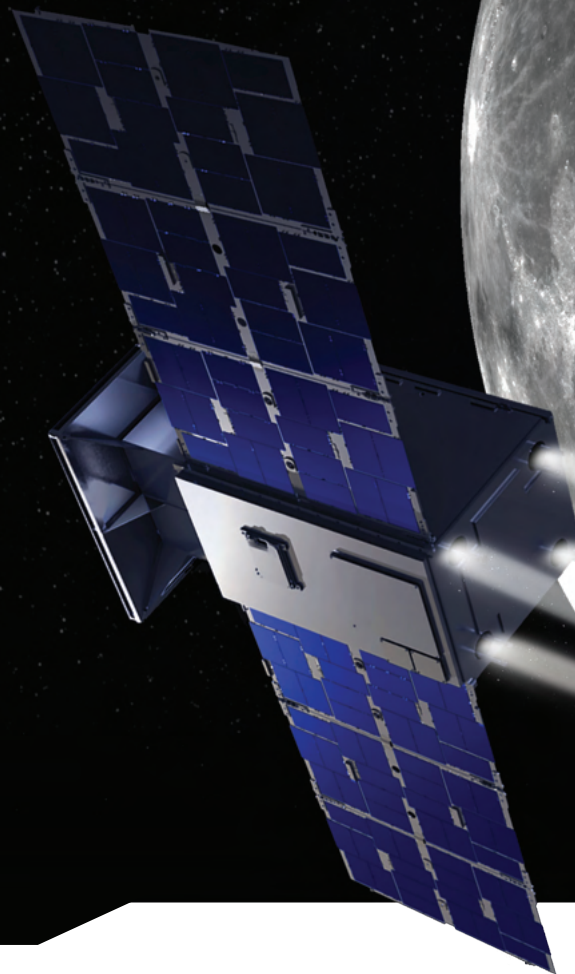
Verify the characteristics of a cis-lunar Near Rectilinear Halo Orbit (NHRO) for future spacecraft
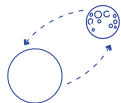
Demonstrate the entering and maintaining of the NHRO orbit that provides a highly efficient path to a frequent, close approach with the the Moon's surface

Lay a foundation for commercial support of future lunar operations

Demonstrate spacecraft-to-spacecraft navigation services that allow future spacecraft to determine their location relative to the Moon without relying exclusively on tracking from Earth

Gain experience with small dedicated launches of CubeSats beyond low-Earth orbit (LEO), to the Moon, and beyond

Demonstrate one-way ranging technique using Deep Space Network (DSN) signals and a Chip Scale Atomic Clock, which allows many users around the Moon to determine position and navigation.

MISSION PARTNERS

NASA

CAPSTONE'S™ development is supported by the Space Technology Mission Directorate via the Small Spacecraft Technology and Small Business Innovation Research programs at NASA's Ames Research Center in California's Silicon Valley. The Artemis Campaign Development Division within NASA's Exploration Systems Development Mission Directorate supports the launch and mission operations. NASA's Launch Services Program at Kennedy Space Center in Florida is responsible for launch management. NASA's Jet Propulsion Laboratory supported the communication, tracking, and telemetry downlink via NASA's Deep Space Network, Iris radio design and groundbreaking 1-way navigation algorithms.

Rocket Lab USA, Inc.

Launch provider launching CAPSTONE™ on the Electron launch vehicle and Photon spacecraft bus.

Orion Space Solution (formerly Astra)

Chip Scale Atomic Clock (CSAC) hardware provider necessary for the 1-way ranging experiment.

TERRAN ORBITAL™

Tyvak Nano-Satellite Systems, Inc., A Terran Orbital Corporation

Spacecraft design, development and implementation, hardware manufacturing, assembly, testing and mission operations support.

Advanced Space

Owner and operator of the CAPSTONE™ mission. Delivering Innovation to Orbit Developers of the proprietary CAPS, Cislunar Autonomous Positioning System, technology being demonstrated using peer-to-peer navigation.

Space Dynamics Laboratory (SDL)

Iris radio and navigation firmware provider.
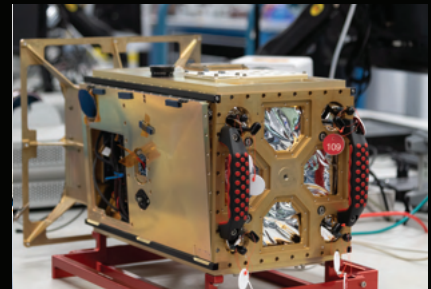
Tethers Unlimited, Inc.

Cross Link Radio provider.

Stellar Exploration

Propulsion subsystem provider.

TERRAN ORBITAL CAPSTONE™ MISSION PATCH

**Visit www.terranorbital.com/CAPSTONE™
to learn more about the CAPSTONE™ Spacecraft and launch.**

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